1.

1

2

1

2

1

2

1

2

3

4 5

1

2

3

An apparatus including thermal stress reduction, comprising:

a mass coupled to the package, the mass having a surface, the mass further including an active region; and

one or more substantially rigid members for attaching at least one point on the surface to the package to create a resilient coupling between the mass and the package wherein at least a portion of the active region is spaced apart from the at least one point of attachment.

- 2. The apparatus of claim 1, wherein the package comprises; a package including a cavity for receiving the mass.
  - 3. The apparatus of claim 1, wherein the package comprises: a package including a recess for receiving the rigid member.
- 4. The apparatus of claim 1, wherein the mass comprises one or more bond pads for coupling the mass to the package.
- 5. The apparatus of claim 4, wherein the bond pads have a cross-sectional shape selected from the group consisting of approximately rectangular, approximately oval, approximately tri-oval, approximately oct-oval, approximately wavy sided rectangular, approximately oct-pie-wedge, approximately hollow oct-pie-wedge, approximately nine-circular, approximately starburst, or approximately sunburst.

6. The apparatus of claim 4, wherein the mass comprises one or more passive regions; and

wherein the bond pads are approximately located in the passive regions.

passive region.

4

1

2

3

1

2

3



PCT/US 00/06832

7.	The apparatus of claim	A, wherein the mass further comprises a first passive
regio	n; and	
	wherein the bond pads a	re approximately located in the first passive region

- 1 8. The apparatus of claim 7, wherein the first passive region is located at one end of the mass.
- The apparatus of claim 4, wherein the mass further comprises a first passive region and a second passive region; and
  wherein the bond pads are located in the first passive region and the second
  - 10. The apparatus of claim 9, wherein the first passive region is located at one end of the mass; and
    - wherein the second passive region is located at the opposite end of the mass.
    - 11. The apparatus of claim 4, wherein the mass further comprises a first passive region integral to the active region; and wherein the bond pads are located in the first passive region.
- 1 12. The apparatus of claim 11, wherein the first passive region is located at one end of the mass; and
- wherein the first active region is located at the opposite end of the mass.
- 1 13. The apparatus of claim 4, wherein the mass further comprises an active region;
  2 and
  3 wherein the bond pads are approximately located in the active region.
- 1 14. The apparatus of claim 13, wherein the bond pads are located in the approximate center of the active region.

22.

2

May Control of	Way I I I I I I I I I I I I I I I I I I I	UUU	OLTCOLO711 L GY + 1 TO_500_02TO		PCT/US OF
N. *	1	15.	The apparatus of claim/ wherein the	rigid members hav	o o orogo gootio—al

1	15.	The apparatus of claim, wherein the rigid members have a cross-sectional shape
2	that is	approximately rectangular or approximately circular.
1	16.	The apparatus of claim 1, wherein the rigid members are approximately located
2	at one	end of the package.
1	17.	The apparatus of claim 1, wherein the rigid members are approximately located
2	at the	approximate center of the package.
1	18.	The apparatus of claim 1, wherein there are one or more first rigid members and
2	one or	more second rigid members;
3		wherein the first rigid members are approximately located at one end of the
4		package; and
5		wherein the second rigid members are approximately located at the opposite end
6		of the package.
		/ V \
1	19.	The apparatus of claim 1, wherein the rigid members are a material selected from
2	the gro	oup consisting of solder, conductive epoxy, non-conductive epoxy, and glass frit.
1	20.	The apparatus of claim 1, further comprising one or more sliding supports coupled
2	to the	package for slidingly supporting the mass.
	/	
1	2]/.	The apparatus of claim 20, wherein the sliding supports have a cross-sectional
2	shape	selected from the group consisting of approximate square, approximate circle,
3		imate triangle and approximate rectangle.
	/	

The apparatus of claim 1, wherein the package comprises:

a package including a pedestal for supporting the rigid members.

3

4

5

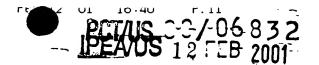
6

23.	The apparatus	of claim, 1,	wherein	the mass	is a	micro-machined	device,	ar
integr	ated circuit chip	, or an optica	al device.					

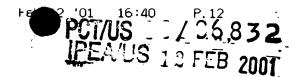
- 1 24. The apparatus of claim 1, wherein the rigid members further electrically couple 2 the mass to the package.
- A method of coupling a mass having an active region to a package to reduce 1 25. 2 effects of thermal stress, comprising:

attaching at least one surface point on the mass to the package using one or more substantially rigid members to create a resilient coupling between the mass and the package, wherein at least a portion of the active region is spaced apart from the at least one point of attachment.

- 1 26. The method of claim 25, wherein attaching the mass comprises attaching the mass 2 at a plurality of locations.
- The method of claim 25, wherein the mass comprises a passive region, and 1 27. wherein attaching the mass comprises attaching the passive region to the package. 2
- 1 28. The method of claim 27, wherein the passive region is located at one end of the 2 mass.
- 1 29. The method of claim 25, wherein attaching the mass comprises attaching the 2 active region to the package.
- The method of claim 29, wherein attaching the active region comprises attaching 1 30. 2 the approximate center of the active region to the package.



	MARIC	PETAIS 2-2-/-06
A Para	1	/
	2	
	3	a second passive region; and
	4	wherein attaching the mass comprises attaching the first passive region to the
	•	package and attaching the second passive region to the package.
	1	32. The method of claim 31, wherein the first passive region is located at one end of
	2	the mass; and
	3	wherein the second passive region is located at an opposite end of the mass.
	1	33. The method of claim 25, wherein the mass further comprises a passive region
	2	integral to the active region; and
	3	wherein attaching the mass comprises attaching the passive region to the package.
	1	34. The method of claim 33, wherein the passive region is at one end of the mass; and
r F	2	wherein the active region is at the opposite end of the mass.
	1	35. The method of claim 25, wherein attaching the mass comprises permitting the
And June form	2	mass to expand and contract without inducing stresses in the mass.
	1	36. The method of claim 25, wherein attaching the mass comprises providing for
	2	expansion and contraction of the package without inducing stresses in the mass.
	1	The method of claim 25, further comprising slidingly supporting the mass at one
	2	or more different locations.
	1	738. The method of claim 37, wherein slidingly supporting the mass comprises
	2	slidingly supporting the mass at a plurality of locations.
	1 /	39. The method of claim 37, wherein slidingly supporting the mass comprises
	2 /	providing for expansion and contraction without inducing stresses in the package.



- 1 40. The method of claim 25, wherein attaching the mass comprises providing for expansion and contraction without inducing stresses in the package.
- 1 41. The method of claim 25, further comprising electrically coupling the mass to the package at one or more different locations.